Binomial Distribution

In probability theory and statistics, the binomial distribution with parameters n and p is the discrete probability distribution of the number of success in a sequence of n independent experiments, each asking a yes-no question and each with its own Boolean-valued outcome: success (with probability p) or failure (with probability q = 1-p). A single success/failure experiment is also called a Bernoulli trial or Bernoulli experiment, and a sequence of outcomes is called a Bernoulli process; for a single trial i.e., n=1, the binomial distribution is bernoulli distribution. The binomial distribution is the basis for the popular binomial test of statistical significance.

$B\ (n,\ p) \qquad where\ n\ is\ the\ number\ of\ trails\ and\ P \epsilon\ (0, 1)$

$$PMF\ =\ P(K,\ n,\ p)\ =\ C^{n}_{K}\ *\ P^{K}\ *\ (1\ -\ P)^{n-K}$$

$$C^{n}_{K}\ =\ \frac{n!}{k!\ (n-k)!}$$

K is the number of success

Mean of Binomial Distribution

$$n\ *\ p$$

Variance of Binomial Distribution

$$n\ *\ p\ *\ q$$

Example

$no.\ of\ trails\colon\ 5$

$probability\ of\ success\ (p)\colon\ 0.5$

$no.\ of\ success\colon\ Varies\ from\ 0\ to\ 5$

$What\ is\ the\ probability\ of\ getting\ exactly\ 3\ heads\ in\ 5\ flips$

$n\ =\ 5\ and\ k\ =\ 3$

$$C_K^n = \frac{5!}{3!\,(5-3)!}$$

$$P(X = 3) = \frac{5!}{3!\,(5-3)!} * (0.5)^3 * (1 - 0.5)^{5-3}$$

$$P(X = 3) = 0.3125$$